



NEWSLETTER

No 3, November 2015

Dear Readers,

The HealthyMinorCereals project successfully ended its second year. During the first two years, our activities focused on genetic and phenotypic characterisation of minor cereals – oat, rye, spelt, and wheat wild relatives. While the genetic characterisation of studied genotypes will soon be completed, the phenotypic characterisation will continue for at least another year. Well under way are field trials evaluating the resistance of selected genotypes to diseases. Good progress was attained in assessing nutritional composition of minor cereals – preliminary results for rye, oat and spelt wheat are presented in this issue. In the second year of the project, field trials to study effects of agronomic practices on the performance of minor cereals were set up in three locations (Czech Republic, Estonia and the UK) representing three climatic zones of Europe.

In April the project Executive Board comprising WP leaders met in Potsdam to discuss project progress. Since then the first periodic report was approved by the EC and we will shortly publish our first public deliverable on the market potential of minor cereal crops via the project website. The next meeting of the whole consortium will be in May 2016, again in Potsdam.

We wish you an enjoyable reading of our news.

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(More information can be found at the project website: www.healthyminorcereals.eu)

Reports from workpackages

WP 1: Genomic characterisation and analysis of minor cereal accessions

Analyses of genetic diversity of oat, rye, spelt and wheat wild relatives accessions are all near to a completion and the results will soon be prepared for publication.

WP2: Phenotyping to determine potential for developing new varieties

Phenotyping of spelt wheat continued in 2015 with 80 genotypes that were selected based on some key traits (e.g. lodging, plant height, heading/maturity date, disease resistance) out of 180 accessions that were included in phenotyping trials in Austria, Estonia, Germany and Switzerland in 2014.

For oats, 112 genotypes (incl. 13 naked oats) were selected for further phenotyping trials in 2015 from the original oat diversity panel that included 264 genotypes.

Due to low germination and winter damage in Estonia 13 genotypes were lost and only a few seeds were harvested for some accessions. Therefore, not enough seeds were available in 2014 for the testing of all accessions at two locations in 2015. This activity has been continuing.

WP3: Evaluation of biotic stresses on minor cereals

First results of evaluating the reaction of selected genotypes of spelt wheat to artificial infection with yellow rust (*Puccinia striiformis*), stem rust (*Puccinia graminis*) and leaf rust (*Puccinia triticina*) performed in field plot trials in Prague-Ruzyně (CRI, Czech Republic) have shown the following:

- a high level of resistance to yellow rust detected in cultivars BADENGOLD, HOLSTENKORN, LONIGO, ZEINERS WEISSER SCHLEGELDINKEL, ZOLLERNSPELZ and ZUZGER,
- a high level of resistance to leaf rust detected in cultivars BADENKRONE, BADENSTERN, FARNSBURG ROTKORN FB6, GUGG 4H, LIESTAL ROTKORN L11, OBERKULMER, OSTRO, ROTER SCHLEGEL DINKEL, ROTTWEILER FRÜH KORN, ROTTWEILER DINKEL ST.6, RUBIOTA, SALEZ, SCHWABENSPELZ, SPY, STRICKHOF, V.RECHBERG BRAUNER WINTER SPELZ, WILLISAUER WEISSKORN WIL17, ZOLLERNSPELZ, ZÜRCHER OBERLÄNDER ROTKORN, FILDERSTOLZ. Only 8 genotypes studied were susceptible to leaf rust.
- only two cultivars tested - SAMIR and SOFIA – showed resistance to stem rust. The other cultivars tested were rated as susceptible.



Stem rust resistant (left) and susceptible (right) cultivars of spelt, observed in early July 2015 in Prague-Ruzyně after artificial inoculation performed in spring (CRI)



An infestation with stem rust (*Puccinia graminis*) as seen on a susceptible cultivar of spelt on 3 July 2015 in Prague-Ruzyně (CRI)

WP4: Effect of agronomic management practices on the performance of minor cereals

The first set of field trials to evaluate the effects and interactions between contrasting genotypes and fertilisation regimes on performance of minor grain cereals in three climatic zones in Europe have been harvested in UK, Czech Republic and Estonia.

Due to the lack of sufficient quantities of seed from the genotyping and phenotyping work the field trials have used varieties with a wide geographic origin and distribution. Part of the rye trial was lost in Estonia due to cold temperature damage over winter. In the UK, spelt was seriously affected by yellow rust (see the picture below) but there were clear varietal differences evident. In comparison the rye was relatively disease free and all varieties showed good standing ability.



In the UK and Czech Republic, clear treatment effects were evident at both sites with differential variety responses between the different sites. In particular, the biogas digestate (as a relatively new source of organic fertiliser) performed very well at both sites when compared with the other fertiliser types used.

Samples from all sites are now being prepared for processing and nutritional quality analysis with samples also being sent to ILU for processing and baking quality tests. Spelt and rye for the second year of this trial has been drilled at all sites with oats to be drilled in the spring of 2016.

In addition a second field trial has been established (autumn of 2015) to examine the effects of contrasting genotypes, tillage and weed control practices on the performance of minor grain cereals in two climatic zones (Newcastle, UK and Prague, Czech Republic).

WP5: Effect of variety mixtures and intercropping on performance of minor cereals

The field trials aimed at identifying the effects of variety mixtures and legume intercrops on crop performance (yield, disease resistance and quality), using various fertiliser input levels and foliar disease treatments, have been established in Greece – Crete and the Czech Republic – Prague, with two varieties of spelt wheat and oat.

WP6: Optimising processing and product development strategies to optimize market potential

Work on WP6 is in progress and detailed report of first results will be presented in the next Newsletter issue.

WP7: Assessing nutritional content of minor cereals and their effects on human cell cultures

Analyses of nutritional compounds are focused on various genotypes of rye, oat, spelt wheat and several wild wheat relatives. To date, 54 rye, 200 oat and 200 spelt genotypes were analyzed for protein, total antioxidants, total phenolics, mineral concentrations and β -glucan. Here, only the results of total antioxidants, total phenolics and β -glucan are summarized:

The total antioxidant activity of the samples has been measured based on the Trolox equivalent assay involving detoxification of ABTS radical. Based on the average values, the spelt genotypes (n:200) had lower antioxidant activity than rye (n:54) and oat (n:200) genotypes. The highest antioxidant activity has been found among the oat genotypes. A few oat and spelt genotypes showed much lower antioxidant capacity than many other genotypes.

The seeds have been also analyzed for the concentrations of total phenolics (TPC). Mostly, the TPC results appeared very similar to the results obtained with total antioxidant activity. The spelt genotypes showed lower TPC values than the genotypes of oat and rye. Two rye genotypes were identified with the highest TPC concentrations while some of the spelt genotypes showed very low TPC concentrations.

As expected, oat genotypes had much higher β -glucan concentrations than rye and spelt. The spelt genotypes showed lowest values and had a very little genotypic variation for β -glucan. In the case of oat and rye, there was a large genotypic variation. The highest values of β -glucan were 4.97 g /100 g for oat, 1.72 g /100 g for rye and 0.55 g /100 g for spelt. A few oat genotypes were found showing very high concentrations of total antioxidants, total phenolics and β -glucan.

The most contrasting genotypes regarding the concentrations of antioxidants, total phenolics and β -glucan will be used in the cell biological assay and also under WP6 for the technological features in the next project period.

WP8: Enhance the market prominence for minor cereals

Under WP8, the first public deliverable on the market potential of minor cereal crops in European regions is now under EC evaluation and we will share it with our readers soon at the project website.

Project communication, cooperation and publicity

The HealthyMinorCereals project and its first results were presented at the 20th International Scientific Conference »Healthy grain for a healthy diet« that took place on 22-23 April 2015, in Potsdam, Germany. Bernadette Oehen of FiBL presented a talk entitled Market potential for minor cereals (spelt, oat, rye) in Europe, presenting results from the market survey in WP8 – see the [conference programme](#).

On 7 July 2015, the HMC project was presented at the field days on spelt, emmer and einkorn organised by the University of Hohenheim, Germany. The presentation was done by Katrin Lehmann, who presented the market potential of minor cereal crops for organic bakeries.

In the Czech Republic, minor cereal varieties studied under the HealthyMinorCereals project were presented at field plots of the Crop Research Institute and PRO-BIO Ltd. at the field days "[Naše pole](#)" in Nabočany on 9-10 June 2015.

In Estonia, the HealthyMinorCereals project was introduced to farmers on several tutorial days, including visits to field trials. See [pictures](#) from field trials and seminars.

In Austria, the HealthyMinorCereals folders were distributed along with the Proceedings of the 65th Annual Meeting of the Austrian Association of Plant Breeders and Seed Merchants that took place in March 2015. Furthermore, the field trials and the process of phenotypic characterisations was presented to students from the University of Ljubljana, Biotechnical Faculty, Slovenia, to students from BOKU University and to a group of professors and post-graduate students from North Dakota State University, Department of Plant Sciences.

In the UK, the University of Newcastle and Gilchesters Organics Ltd. jointly presented minor cereals field trials at Nafferton Ecological Farming Group (UNEW) and organised a guided tour of Gilchesters facilities (organic spelt production, milling and baking) on 11 July 2015 attended by 15 participants.

Future events:

On 18-21 April 2016, the [15th International Cereal and Bread Congress](#) will take place in Istanbul, Turkey. The presentation of the HealthyMinorCereals project results at this Congress is being considered. Please follow our website to get final information.

On 9-10 June 2016, the HealthyMinorCereals project will be presented for the third time at the field days „Naše pole“ in Nabočany, Czech Republic. Look for the stands and field plots of the Crop Research Institute and PRO-BIO Ltd, where all five minor cereal crops studied in the project will be on display and consultancy offered.

On 11 - 15 July 2016, [10th International Oat Conference](#) will be held in St. Petersburg, Russia. Results from WP1 on oat genotypic characterisation will be presented at this conference.

Partners in the HealthyMinorCereals project

The project consortium includes nine academic centres (six research institutes and four universities) and seven SMEs located in 10 European or Associated countries.

1. Crop Research Institute (CRI), Czech Republic, Coordinator
2. PRO-BIO Trading Company Ltd. (PROBIO), Czech Republic
3. Selgen a. s. (SEL), Czech Republic
4. University of Newcastle upon Tyne (UNEW), United Kingdom
5. Gilchesters Organics Ltd. (GIL), United Kingdom
6. Sabanci University, Faculty of Engineering and Natural Sciences (SU), Turkey
7. Research Institute of Organic Agriculture (FiBL), Switzerland
8. Getreidezüchtung Peter Kunz (GZPK), Switzerland
9. Volakakis Nikolaos (GEO), Greece
10. Estonian Crop Research Institute (ETKI), Estonia
11. University of Natural Resources and Life Sciences (BOKU), Austria
12. Institut für Lebensmittel-und Umweltforschung e.V. (ILU), Germany
13. Stolzenberger's Bakery (SB), Germany
14. University of Kassel, Section of Organic Breeding and Agro-Biodiversity (UNI KASSEL), Germany
15. Grupa BGK Spółka z o.o. (BGK), Poland
16. Hungarian Research Institute of Organic Agriculture (ÖMKi), Hungary

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The HealthyMinorCereals project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 613609.